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Branchiostegal rays six.

Dorsal and anal fins confluent with the caudal, and uninterrupted.

Pectoral fins fan-shaped, rather small, and inserted rather low.

Ventral fins obsolete.

The *Ophidium imberbe* of Linn., as understood by recent authors, and the *O. stigma* of Lay and Bennett, do not belong to this genus. The latter is distinguished by its scaly body.

GYMNELIS VIRIDIS Reinhardt.

*Synonymy.*

*Ophidium viride* Fabricus, Fauna Groenlandica, p. 141. Bloch, Schneid., p. 486. Ross, Reinhardt.

*Ophidium unernak* Lacépède, Histoire Naturelle des Poissons, tome ii. p. 286.

*Gymnelis viridis* Reinhardt, Kongelige Danske Videnskabernes Selskabs Nat. og Mat. Afhandlingar, deel vii. Kroyer, Voyage en Scandinavie, en Laponie, au Spitzberg et aux Farøe, &c., sur la corvette "La Recherche," Poissons, tab. 15. Richardson, Last of the Arctic Voyages, p. 371, pl. 30. Kroyer, Naturhistorisk Tidsskrift Stiftet af Henrik Kroyer, udgivet af Prof. J. C. Schiødte, naepes iii. hafte 2, 1862. Günther, Catalogue of the Fishes in the British Museum, vol. iv. p. 323.

*Cepolophis viridis* Kaup, Archiv für Naturgeschichte.

*Hab.*—Greenland.

#### Descriptions of the GOBIOID genera of the Western coast of Temperate North America.

BY THEODORE GILL.

In the present article, detailed descriptions are submitted of three genera represented on the coasts of the Pacific United States. Although more than usually detailed, it is believed that no characters except such as are strictly generic are included; the brief references made to other genera will assist in obtaining an idea of the character of variation in the family. After having seen as numerous species as any of my predecessors, I am convinced that many natural genera are included under the name *Gobius*. A number of these have already been named, but others yet remain without designation.

The subfamily Gobiinæ is the only one so far known to be represented in the Californian and Oregon waters. Further south, the subfamilies Eleotrinæ, Sicydiinæ,\* and Amblyopinæ occur.

Genus CORYPHOPTERUS Gill.

*Synonymy.*

*Gobius* sp. auct.

Body robust, considerably compressed, especially towards the back and caudal fin, with the anus considerably in advance of the middle; caudal peduncle oblong, high, and not contracted.

Scales regularly imbricated, large, more or less hexagonal, with the posterior margin pectinated, the nucleus at or near the posterior angle, and with striæ radiating thence towards the anterior margin; the scales cease near the nape.

Head scaleless, oblong, above nearly square and transversely arched behind the eyes; the sides compressed downwards; cheek scarcely tumid; snout oblique; eyes rather large, longitudinally elliptical, oblique, very closely approximated, and situated chiefly or wholly in the anterior half of the head;

\* The Sicydiinæ are represented by four genera, *Sicydium*, (old world), *Sicyopterus* (new world), *Sicyopus* (without labial teeth, &c., and embracing *Sicydium xosterophorum* Blkr., and *S. balinense* Blkr.), and *Sicyogaster* Gill, (nec Barneville = *Gobiesox*).

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opercula unarmed; operculum well developed, as long as or longer than the interval between it and the eye.

Mouth with the cleft oblique, longitudinal, the periphery of each jaw semi-elliptical, the supramaxillars under or nearly under the pupil; lower jaw slightly projecting beyond the upper; intermaxillars slightly protractile downwards, with the posterior processes moderate, and the lateral branches thick and attenuated towards their ends, but with a thin crest above; supramaxillars longer than the intermaxillars, behind the apophysis slightly twisted, nearly rectilinear, compressed and slightly expanded downwards behind, and produced towards the inferior angle.

Tongue rather thin, oblong, truncated in front, and free.

Teeth elongate, curved, acutely conic, pluriserial in front, continued to the angles of the mouth; enlarged and distant in front, in a row along the margin of each jaw; again increasing and bent backwards in the posterior row.

Branchial apertures lateral, nearly vertical, above bounded by a membrane attached in front of the axil of the pectoral; below continued forwards in a short slit between the fourth branchiostegal ray and breast.

Branchiostegal rays five.

Dorsal fins distinct; the first with six spines, all flexible, the third generally longest, the sixth remote; second oblong, generally increasing backwards, and with most of its rays having an anterior simple and a posterior forked branch; the last ray free.

Anal opposite and similar to the dorsal, nearly coterminous with it.

Caudal fin well developed, rounded behind.

Pectoral fins rounded behind, at the base subvertical and not continued to the plane of the breast, with its rays well defined, and, except one or two upper and lower ones, branched.

Ventral fins inserted below the base of the pectoral, very obliquely infurciform, the inner rays longest and well connected; the interspinous membrane low.

*Type, Coryphopterus glaucofrænum.*

This genus is most nearly related among those hitherto named to *Ctenogobius* Gill, but is distinguished from that type by the short, robust body, the less abruptly decurved snout, the dentition and want of bent canines in the lower jaw in the male,\* and the structure of the dorsal and anal fins.† The genus probably includes several species referred to *Gobius*, such as the Mediterranean *G. Lesueurii* Risso.‡

#### CORYPHOPTERUS GLAUCOFRÆNUM Gill.

The height of the body is contained about five times in the total length; the head about  $4\frac{1}{3}$ , and the caudal nearly the same. The head is not far from twice as long as high; the diameter of the eye enters nearly  $3\frac{1}{2}$  times in the head's length, and is larger than the snout. The pectoral equals about a fourth, and the ventral about a fifth, of the total length; the dorsal and anal fins increase in height backwards, where they about equal the height of the body.

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There were apparently twenty-five vertical rows of scales, and seven longitudinal ones, between the dorsal and anal fins.

The body is tawny, with a faint blue spot in the centre of each scale, and with

\* The presence of canine teeth in *Ctenogobius* is a sexual character; but in the new genus, these teeth are probably absent in both sexes.

† *Ctenogobius fasciatus* has six dorsal spines, although, by a typographical error, "V" has been assigned to it in the original description.

‡ In addition to *Gobius*, *Coryphogobius*, *Aphyia*, and *Brachyochirus*, there are several other genera of European Gobies. *G. minutus* is the type of one (*Pomatoschistus*), distinguished by the small scales, extension of branchial aperture above, (a character hitherto unnoticed,) &c. *G. quadrimaculatus*, of another (*Dellenosteus*), allied to *Coryphogobius*, but distinguished by the structure of the dorsal and anal fins and the triangular shape of the lower pharyngeal bones. Both have several species.

six spots formed by aggregations of dark dots on the ridge of the back, between the second dorsal spine and the axil of the soft dorsal fin; the first spot below the interval between the second and third spines; the second below that, between the fifth and sixth; the third between the dorsals; the fourth below the fourth ray; the fifth below the seventh, and the sixth below or behind the tenth or last. Another row of similar but fainter spots runs from the scapular region, and a third row along the middle of the sides on every third or fourth scale, while at the base of the caudal there is a spot above and another below the middle. The humeral region is bluish. The head is tawny, with three dark spots between the forehead and dorsal; a larger above the operculum, surmounted above by a blue dot; three blue dots below the oculo-scapular groove, the first two nearest and behind the eye, the third on the operculum. A straight blue line crosses the cheek above and slightly upwards, and is continued, after interruption, on the operculum; above and below it are dark dots, especially closely aggregated below, behind the angle of the mouth. The dorsal fins have a few faint blue spots.

A single specimen of this species, one inch and seven-tenths long, was obtained by Dr. Kennedy, the naturalist of the northwest Boundary Commission, in Washington Territory.

Genus EUCYCLOGOBIUS Gill.

*Synonymy.*

Eucyclogobius Gill, Proc. Academy of Natural Sciences of Phila., 1862, p. 279.

Gobius (Gd.) sp. Girard.

Lepidogobius sp. Gill.

Cyclogobius sp. Steindachner.

Gobius (L.) sp. Günther.

Body robust, subfusiform, compressed towards the caudal fin, with the anus scarcely in advance of the middle; behind very slowly decreasing in height towards the caudal peduncle, which is oblong, and not, or scarcely, contracted at its middle.

Scales regularly imbricated, small, cycloid, ovoid, with the nucleus behind the centre, with numerous radiating striæ diverging towards the front and sides, and with concentric striæ or wrinkles behind. The scales advance forwards nearly or quite as far as the nape.

Head scaleless, oblong, conoid, subquadrangular behind, and nearly as wide as high, above transversely convex in front of the nape and on the sides. Opercula compressed; cheeks scarcely tumid; snout oblique; eyes moderate, longitudinal elliptical, nearly lateral, rather distant from each other, and situated nearly in the middle of the anterior half of the head. Opercula unarmed; operculum well developed, nearly as long as the interval between it and the eye.

Mouth with the cleft oblique, longitudinal, the periphery of each jaw ovoid, the supramaxillars extending beneath the eye. Lower jaw nearly even with or scarcely projecting beyond the upper. Intermaxillars slightly protractile downwards, with the posterior processes short and wide, and with the lateral branches thick and attenuated towards the ends, but with a thin crest above (behind), along the posterior half. Supramaxillars nearly twice as long as the intermaxillars, with a compound apophysis in front, thence nearly rectilinear, but twisted, narrow, and only slightly dilated below towards the ends.

Tongue thick, emarginated in front, and free.

Teeth curved conic, pluriserial; those of the outer row of the upper jaw enlarged.

Branchial apertures lateral, nearly vertical, bounded above by a membrane attached in front of the axil of the pectoral fin; below continued forwards in a slit between the fourth ray and the breast.

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Branchiostegal rays five.

Anal papilla moderate, oblong, and compressed.

Dorsal fins entirely separated; the anterior considerably behind the pectoral region, convex, and with seven or eight spines. The second oblong (I. 12), with its rays mostly simply bifurcated, and with the last free behind.

Anal fin shorter than the second dorsal, but even with it behind, and with its structure similar.

Caudal fin well developed, convex behind, and with numerous supplementary rays above and below its peduncle.

Pectoral fins wide, produced and rounded behind, with the base nearly vertical, but slightly concave, not extending below to the plane of the breast. The upper rays, like the others, are well defined and branched.

Ventral fins inserted below the bases of the pectoral, simply infundibuliform, with the inner rays longest and connected, and with the interspinous membrane low.

The genus *Eucyclogobius* is very distinct from *Lepidogobius*, differing especially in the robust, subfusiform body, the size and position of the eyes, wider forehead, shape of jaws, and especially the position of the ventral fins. Only one species is yet known.

#### EUCYCLOGOBIUS NEWBERRII Gill.

##### *Synonymy.*

*Gobius Newberrii* Girard, Proc. Academy of Natural Sciences of Phila., vol. viii. p. 128, 1856. Girard, Boston Journal of Natural History, vol. vi. p. 539. Pl. xxv, figs. 5—8, 1857. Girard, Explorations and Surveys for a Railroad Route, vol. x. Fishes, p. 128.

*Lepidogobius (Newberrii) Gill*, Annals of the Lyceum of Natural History of New York, vol. vii. p. 14, 1858.

*Gobius Newberrii Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. iii. p. 77, 1861.

*Eucyclogobius (Newberrii) Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 279.

*Eucyclogobius Newberrii Gill*, op. cit., 1862, p. 330.

#### Genus LEPIDOGOBIUS Gill.

##### *Synonymy.*

*Lepidogobius Gill*, Annals of the Lyceum of Natural History of New York, vol. viii. p. 14, 1859.

*Cyclogobius Steindachner*, Beiträge zur Kenntniss der Gobioiden in Sitzungsberichte der kaiserlichen Akademie der Wissenschaften, Math. Nat. Classe., Band xlii. p. 284, 1861.

*Lepidogobius Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 330.

*Gobius Girard*, Explorations and Surveys for a Railroad Route, &c., to the Pacific Ocean, vol. x., Fishes, p. 127.

*Gobius* sp. Günther.

Body elongated, slender, compressed, with the anus in advance of the middle of the total length; behind very slowly decreasing in height towards the caudal peduncle, which is elongated, but scarcely narrowed at the middle.

Scales regularly imbricated, small, cycloid, ovoid, subtruncated in front, with the nucleus in the anterior half, and with numerous radiating striæ diverging towards the front and with concentric striæ behind; scales advancing forward above as far as the eyes, and on the sides to the suborbital region.

Head elongated, conoid, subquadrangular behind, and there about equally high and wide; above transversely convex, with the nape undefined, the scales advancing to the eyes; the opercula subvertical; cheeks not tumid, scaly. 1863.]

like the preoperculum and operculum; snout oblique. Eyes large, longitudinal elliptical, oblique, and closely approximated, situated chiefly or entirely in the anterior half of the head. Opercula unarmed; operculum well developed, as long as or longer than the region between it and the eye.

Mouth with the cleft oblique, longitudinal, the periphery of each jaw ovoid, the supramaxillars ending beneath the pupils. Lower jaw even or slightly projecting beyond the upper. Intermaxillars slightly protractile downwards, with the posterior processes short and wide, rounded at their ends; with the lateral branches thick and attenuated towards the ends, but with a thin crescentiform crest above, along the posterior half. Supramaxillars nearly twice as long as the intermaxillars, with a compound apophysis in front: thence nearly rectilinear, compressed, highest at the middle, again slightly enlarged and convex at the ends.

Tongue thick, emarginated in front, and free.

Teeth conic, curved, pluriserial; those of the upper jaw enlarged in the outer row. Palate smooth; vomer projecting.

Branchial apertures lateral, nearly vertical, bounded above by a membrane attached near the axil of the pectoral fin; below, continued forwards in a short slit between the fourth ray and the breast.

Branchiostegal rays five.

Anal papilla small.

Dorsal fins considerably separated; the first considerably behind the ventrals, oblong, convex at the middle, and with seven slender spines, between the last of which and the penultimate a wider interval exists. Second dorsal rather long (l. 19 pm.), with most of its rays with the anterior branch single and the posterior bifurcated. Last ray free behind.

Anal fin shorter than the dorsal (l. 16 pm.), but coterminous behind with it and of similar structure.

Caudal fin well developed, convex behind, and with numerous supplementary rays above and below its peduncle.

Pectoral wide, produced and rounded behind, with the base little oblique, but extending nearly to the plane of the chest, with its superior as well as the other rays well defined and branched.

Ventral fins considerably behind the pectoral, very obliquely infundibuliform, the inner rays longest and well connected; the interspinous membrane low.

The genus *Lepidogobius* is readily distinguished by its elongated body, small cycloid scales, form of head, development of the fins, and especially by the posterior insertion of the ventral fins. A single species has been discovered: the *Gobius Newberryi*, formerly referred to it when known only through the description of Girard and the comparison instituted between it and *L. gracilis*, belonging to a distinct genus. The type of *Lepidogobius* has been placed by Dr. Günther in a section of *Gobius* characterized by having "the anterior dorsal with seven to nine spines." In this section, besides *Lepidogobius*, species of the genera *Eucyclogobius*, *Acanthogobius*, (nearly allied to *Awaous*, but having an increased number of spines and a scaly head), *Chaeturichthys* R., and two Japanese genera have been placed. One of the latter genera, typified by *Gobius virgo* T.S., is distinguished by the long dorsal and anal fins (VIII. l. 25—27. A. l. 26.), very small scales, and the form of the head; it may be called *Pterogobius*. Another resembles *Gobionellus* Gd., but is distinguished by the increased dorsal and anal fins (D. VIII.—IX. 20. A. 17.), &c. It is represented by *Gobius hasta*, which may be called *Synechogobius hasta*.

#### *LEPIDOGOBIUS GRACILIS* Gill.

##### *Synonymy.*

*Gobius gracilis* Girard, Proc. Academy of Natural Sciences of Phila., vol. vii. p. 134, 1854.

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Not *Gobius gracilis* *Jenyns*.

*Gobius lepidus* *Girard*, Explorations and Surveys for a Railroad Route, &c., vol. vi., Abbot's Report, Zoology, p. 21 (figured). *Girard*, op. cit., vol. x., Fishes, p. 127, pl. xxva, figs. 5-6. *Girard*, op. cit., vol. x. Williamson's Report, Zoology, p. 86.

*Lepidogobius gracilis* *Gill*, Annals of the Lyceum of Natural History of New York, vol. vii. p. 14, 1859.

*Gobius lepidus* *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. iii. p. 78, 1861.

*Lepidogobius gracilis* *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 330.

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The color is tawny or reddish-brown, (thickly dotted with blackish-purple when viewed under the magnifier); the snout, interorbital region and lips, purplish; the branchiostegal membrane dark purple. The fins are also purple, and thickly dotted with darker, especially between the rays.

#### On the GOBIOIDS of the Eastern Coast of the United States.

BY THEODORE GILL.

Subfamily GOBIINÆ (Bon.) Gill.

Genus GOBIUS *Artedi*.

#### *Synonymy.*

*Gobius Artedi*, Genera Piscium.

*Gobius Cuvier*, Règne Animal ed, tome ii.

*Gobius Cuv. et Val.* Hist., Nat. des Poissons, tome xii. p. 1.

*Gobius Günther*, Cat. Acanthop. Fishes, vol. iii. p. 3.

Body moderately elongated, subcylindrical anteriorly, slowly declining and compressed towards the caudal fin, with the anus little in advance of the middle of the total length, and with the caudal peduncle oblong and not or scarcely contracted at its middle.

Scales moderate, (in 35—55 transverse rows), more or less hexagonal, generally higher than long, pectinated behind, with the nucleus at or next to the posterior angle, and with radiating striæ diverging from it towards the anterior border; scales generally advancing forwards on the crown.

Head oblong, depressed, wider than high, slowly declining to the snout, and with the snout itself, in front, boldly decurved; above conical, rather rapidly narrowed to the snout, whose periphery is convex. Cheeks behind more or less tumid. Eyes moderate, longitudinal elliptical, oblique and looking upwards, closely approximated and situated almost, or wholly, in the anterior half of the head. Opercula unarmed. Operculum moderate, shorter than or equal to the interval between it and the eyes.

Mouth with the cleft longitudinal, ovoid, the supramaxillars under the pupils. Lower jaw even with, or rather shorter than the upper. Intermaxillars little protractile obliquely forwards, with the posterior processes short, the lateral branches thick, little attenuated backwards and above, with a thin elevated crest, generally truncated in front and decurved behind. Supramaxillars longer than the intermaxillars, slightly twisted, towards the ends compressed and decurved, and with a narrow expansion downwards.

Tongue moderate, rather thin, truncated and free in front.

Teeth fixed, acutely conic and curved, pluriserial, enlarged in the outer row. Palate smooth.

Branchial apertures lateral, vertical, bounded above by a membrane attached in front of the upper pectoral rays, below continued in a short slit between the fourth branchiostegal ray and breast; isthmus very wide.

1863.]